

REMARKS

Claims 1-7, 10-23, 25 and 27-34 were previously pending in this application. Claims 1-7, 10-23, 25, and 27-34 are pending for examination with claims 1, 20, and 25 being independent claims. Claims 1, 12-15, 19-23, 25, and 28-32 have been amended for clarification purposes. No new matter has been added.

Rejections Under 35 U.S.C. § 112

Claims 21-23 are rejected under 35 U.S.C. § 112, second paragraph. Applicant disagrees that claims 21-23 are indefinite.

A “predetermined quantity” or “a suspended solids content sufficient to allow it to be returned” to either the impure water source or to the ocean is a specific concentration or limit that can be typically determined or chosen by a user of the method or the controller of the system. The concentration or limit may also be a value or range of values set by regulations. In the present application, for example, one skilled in the art would determine the quantity of suspended solids in the reverse osmosis reject that would be sufficient to allow it to be returned to an impure water source. (See Application at page 5, lines 6-9.) Similarly, one skilled in the art would be able to readily define a “sufficient” suspended solids content for allowing it to be returned to either the impure water source or the ocean because it can be the content, for example, that provides discharge levels that may not be exceeded by regulations. (See Application at page 8, lines 9-16.) In the present application, for example, one skilled in the art would determine the “sufficient” suspended solids content because, given that the total suspended solids are a function of the feed water, and that the discharge levels are regulated by permit, the overall recovery of the plant may be controlled such that the discharge levels would not be exceeded. (See Application at page 8, lines 9-16.) In certain circumstances, the reverse osmosis reject may be discharged to the ocean or other receiving body of water, for example, at a concentration of 30-50 mg of suspended solids per liter of wastewater. (See Application at page 8, lines 3-6.)

Therefore, claims 21-23 are definite. Accordingly, reconsideration and withdrawal of rejections of claims 21-23 under 35 U.S.C. § 112, second paragraph is respectfully requested.

Rejections Under 35 U.S.C. § 102

Claims 1-2, 6-7, 10, 16-17, and 20 are rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Daly, et al. in U.S. Patent No. 6,120,688 (hereinafter “Daly”). Applicant disagrees with this rejection because Daly fails to teach each and every limitation recited in independent claims 1 and 20.

Daly does not disclose the present invention as recited in amended claim 1. Specifically, Daly does not disclose a method of purifying impure water comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a filtrate, and backwashing the primary microfiltration or ultrafiltration unit with the filtrate.

Additionally, Daly does not disclose the present invention as recited in claim 20. Specifically, Daly does not disclose a method of facilitating the purification of impure water, the method comprising, in part, the steps of providing a secondary microfiltration or ultrafiltration unit to produce a filtrate, and providing a controllable fluid pathway for directing the filtrate to backwash said primary microfiltration or ultrafiltration unit, as recited in claim 20.

The teaching of Daly discloses a method of purifying impure water using an apparatus, comprising the steps of providing a microfiltration unit, a first reverse osmosis unit, a second reverse osmosis unit, and a clean-in-place (CIP) tank containing concentrated retentate. The concentrated retentate is used to backflush the microfiltration unit. (Daly at col. 2, line 55 – col. 3, line 21; and col. 6, lines 45-67.) This is in contrast to the present invention, wherein the filtrate, and not the retentate, is used to backflush the microfiltration unit. Therefore, independent claims 1 and 20 are not anticipated by the teaching of Daly.

Dependent claims 2, 6-7, 10, and 16-17, which depend directly or indirectly from independent claim 1, are not anticipated by the teaching of Daly for at least the reasons stated above.

Therefore, for at least the reasons stated above, claims 1-2, 6-10, 16-17 and 20 are novel over the teaching of Daly.

Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102 is respectfully requested.

Rejections Under 35 U.S.C. §103

Dependent claims 3 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claims 1 and 17.

Applicant disagrees that dependent claims 3 and 18 would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claims 1 and 17. As discussed above, Daly does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a filtrate and a retentate, and backwashing the primary microfiltration or ultrafiltration unit with the filtrate, as recited in claim 1, from which claims 3 and 18 depend. Further, Daly does not disclose backwashing the secondary filter.

As discussed above, Daly is directed to a method and apparatus for purifying impure water using a concentrated retentate to backflush a microfiltration unit. (Daly at col. 3, lines 18-22.) One skilled in the art would not have modified the method and apparatus of Daly by substituting use of a filtrate to backflush the microfiltration unit for the retentate. Viewing this reference in its entirety, the microfiltration membranes are flushed with reverse osmosis retentate to purge foulants such as solids or particles from the pores or surface of the membranes. (Daly at col. 6, line 66 to col. 7, line 3.) Daly teaches that the retentate from the second reverse osmosis unit is used to dislodge foulants from the microfiltration membrane, while the filtrate provides potable water to a storage tank. (Daly at col. 6, lines 36-39 and 51-53; col. 7, lines 11-14.) Modifying Daly by using the filtrate from the second reverse osmosis unit to dislodge foulants from the membrane would be undesirable because the intention in Daly is to store and use the filtrate as potable water.

One of ordinary skill in the art would recognize, as does the specification of the present application, that there is an inherent problem with such an approach as used in Daly, namely that the reverse osmosis concentrated retentate can form scales or particles due to the concentration effects of the reverse osmosis process, or may be contaminated with biological growth. Such particles or biological growth could in fact foul the clean or filtrate side of the microfiltration or ultrafiltration membranes if residual reverse osmosis retentate is used directly to backwash the microfiltration or ultrafiltration membranes. (See specification at page 2, lines 13-20).

Therefore, because Daly fails to disclose each and every limitation of independent claim 1, this claim is not obvious over this reference. Dependent claim 3, which depends from

independent claim 1, further distinguishes the present invention over Daly which fails to include any teaching, suggestion or motivation of the present invention.

Accordingly, reconsideration and withdrawal of the rejection of dependent claims 3 and 18 under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 4 and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Marius et al. in U.S. Patent No. 5,059,317 (hereinafter “Marius”).

The rejection is improper because no proper *prima facie* case of obviousness has been established. Moreover, any *prima facie* case of obviousness is rebutted because the teachings of Daly and Marius fail to disclose, teach or suggest a method of purifying impure water comprising, in part, treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a filtrate and a retentate, and backwashing the microfiltration or ultrafiltration unit with the filtrate, as recited in claim 1, from which claims 4 and 5 depend.

One skilled in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. As noted above, the teaching of Daly discloses a method for backwashing microfiltration membranes with a concentrated reverse osmosis retentate. (Daly at col. 7, lines 1-3.) Daly does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a filtrate and a retentate, and backwashing the primary microfiltration or ultrafiltration unit with the filtrate, as recited in independent claim 1, from which dependent claims 4 and 5 depend. As explained above, the retentate is not the same as the filtrate. Further, Daly does not disclose a method wherein the secondary filter is a cartridge filter, or wherein the secondary filter is backwashed, as recited in dependent claims 4 and 5.

The teaching of Marius does not cure the deficiencies of Daly. Marius discloses an apparatus for filtering drinking water using a mixed bed ion exchange device. (Marius at col. 1 at line 68 to col. 2, line 2.) Marius does not disclose a method comprising, in part, the steps of treating the residual reverse osmosis stream by passing the stream through a secondary filter to produce a treated residual reverse osmosis stream, and backwashing the primary microfiltration or ultrafiltration unit with the treated residual reverse osmosis stream, as recited in independent claim 1, from which claims 4 and 5 depend. Marius also does not disclose a method using a

cartridge filter as a secondary filter, or wherein the secondary filter is backwashed as recited in dependent claims 4 and 5. On the contrary, the teaching of Marius discloses using an ion exchange device to further purify water that has been filtered by a reverse osmosis device to provide drinking water. (Marius at col. 3, lines 32-38.) This is in contrast to the subject matter of the present application, wherein the claims recite that the residual reverse osmosis stream (the retentate, not the filtrate) is processed through a secondary filter.

Thus, one of ordinary skill in the art would not have been motivated to modify the teaching of Daly with the teaching of Marius. While Daly uses an additional filtration device in the form of a reverse osmosis unit to provide a retentate, Marius uses an ion exchange device to further filter contaminated water to provide drinking water. Therefore, one of ordinary skill in the art looking to use concentrated retentate from a reverse osmosis unit to backwash a microfiltration unit would not have been motivated to modify the reverse osmosis unit with an ion exchange device that filters the filtrate of a reverse osmosis unit to provide drinkable water.

Even if the teachings of Daly and Marius were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Marius would have produced a method and apparatus for treating contaminated water comprising a microfiltration device, a reverse osmosis device and an ion exchange device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate to be used for backwashing the microfiltration filter. Therefore, the combination of the teachings of Daly and Marius do not teach each and every limitation of dependent claims 4 and 5.

Accordingly, reconsideration and withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully requested.

Dependent claims 11-15, 19, 25, and 27-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable by the teaching of Daly as applied to claim 1, and further in view of Water Encyclopedia (Jay Lehr, editor, John Wiley & Sons, Inc., New York, 2005) (hereinafter “Encyclopedia.”)

Applicant disagrees that claims 11-15, 19, 25, and 27-35 would have been obvious to one of ordinary skill in the art over the teaching of Daly as applied to claim 1, and further in view of the teaching of Encyclopedia. The rejection is improper because no *prima facie* case of

obviousness has been established. Further, any *prima facie* case of obviousness is rebutted because the alleged combination would lack at least one recited element.

One skilled in the art would not have been motivated to combine the teaching of Daly with the teaching of Encyclopedia. As noted above, there is no teaching in Daly to further purify the residual reverse osmosis stream for further use because the concentrated retentate portion, and not the treated filtered portion, is desired for backwashing. In contrast, the various chemical, radiation, and physical treatments taught in Encyclopedia are intended to further purify or enhance the stream to provide drinkable water. One of ordinary skill in the art looking to use a serially concentrated reverse osmosis retentate to backwash a microfiltration unit as in Daly would not have been motivated to then treat the retentate to purify and enhance it, as suggested by the Examiner. Additionally, the deficiencies of Daly are not cured by the teaching of Encyclopedia. Encyclopedia does not disclose, teach or suggest a method, as recited in claims 11-15, and 19, or a system as recited in claims 25, and 27-34. Therefore, the combined teachings of Daly, in view of Encyclopedia would have failed to teach each and every claimed element.

Even if the teachings of Daly and Encyclopedia were combined as suggested by the Examiner, the combination fails to teach each and every claimed element. The combination of Daly and Encyclopedia would have produced a method and apparatus for treating contaminated water comprising a microfiltration device, and a reverse osmosis device. The retentate of the reverse osmosis stream would be directed to another reverse osmosis stream to further concentrate the retentate to be used for backwashing the microfiltration filter. The filtrate of the reverse osmosis device would be further treated by the various water treatments disclosed in Encyclopedia. Therefore, the combination of the teachings of Daly and Encyclopedia do not teach each and every limitation of claims 11-15, 19, 25, and 27-34.

For at least the reasons mentioned above, claims 11-15, 19, 25, and 27-34 would not have been obvious over the teaching of Daly as applied to claim 1 and further in view of Encyclopedia.

Accordingly, reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, reconsideration is respectfully requested. This application should now be in condition for allowance; a notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762 (Ref. No. M2019-7022US).

Respectfully submitted,
Joseph Edward Zuback, Applicant

By: /Sandra Szela Congdon/
Peter C. Lando, Reg. No. 34,654
Sandra Szela Congdon, Reg. No. 60,655
LOWRIE, LANDO & ANASTASI, LLP
One Main Street
Cambridge, Massachusetts 02142
United States of America
Telephone: 617-395-7000
Facsimile: 617-395-7070

Siemens Ref. No.: 2004P87070WOUS

Memcor Ref. No.: IPD-C337-US

LLA Ref. No.: M2019-7022US